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# A Comparative Study of China and Japan's post-disaster Temporary Housing Areas: Sichuan and Tohoku

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In events separated by less than four years, both Wenchuan, China and Tohoku, Japan suffered massive natural disasters that resulted in not only enormous loss of life but also the dislocation of millions of refugees. This resulted in the need for government-provisioned, long-term emergency housing. In the years of recovery following these disasters, both populations expressed different mental health outcomes; although a significant number of Chinese and Japanese survivors living in Temporary Housing Shelters (THS) developed PTSD and major depression, the Sichuan population did not appear to express the phenomenon of “*kodokushi*”— or individuals who die following prolonged isolation. In contrast to this, the THS residents in Tohoku, Japan did suffer *kodokushi* despite a concerted government and volunteer prevention effort motivated by cases of *kodokushi* following the 1995 Hanshin Awaji Earthquake. The goal of this article is to compare the design of THS complexes in both Sichuan and Tohoku and investigate whether THS engineering decisions can lead to an improved mental health outcome in post-disaster refugee communities, and whether necessitated physical activity and social contact aided the Chinese disaster victims in avoiding symptoms similar to *kodokushi*.

## Sichuan and Tohoku: Background

On May 12<sup>th</sup> 2008, an earthquake registering as 7.9 Mw struck the Sichuan Province of Ngawa Prefecture, China.<sup>1)</sup> Following the initial earthquake, strong aftershocks continued for months leading to further casualties and damage to buildings.<sup>2)</sup> As of 2015, the Chinese government's official casualty tally stands at nearly 70,000 dead and 18,000 missing.<sup>3)</sup> The central Chinese government has stated that 2.9 million buildings were destroyed, rendering 5 million people homeless, while local government officials in Sichuan place the number near 8 million destroyed buildings and 11 million people rendered homeless.<sup>4, 5)</sup> In order to house these evacuees, the Chinese government immediately set about constructing one million Temporary Housing Shelters (THS), completing 60,000 units in just one month following the disaster.<sup>6)</sup> However, the enormity of the task meant that some evacuees were not able to move into a THS unit until 2009.<sup>7)</sup> As a stopgap measure, many foreign NGOs such as I Bought a Shelter (UK) and Habitat for Humanity (USA) assisted the Chinese government by

providing tents and funds for additional temporary housing.<sup>8)</sup> By 2011, three years after the earthquake, all of the THS housing in Sichuan was disassembled and THS residents were relocated to permanent reconstructive housing (CODE: Citizens towards Overseas Disaster Emergency NGO, personal communication, October 10 2015).

Four years after the Sichuan Earthquake, on March 11<sup>th</sup> 2011, the 9.0 Mw Great Tohoku Earthquake and Tsunami resulted in 16,000 deaths, 2,500 missing persons and 390,000 destroyed homes in Northeast Japan.<sup>9, 10)</sup> Unlike the Sichuan Earthquake, much of the destruction in Tohoku was caused not by the earthquake itself but the ensuing tsunami.<sup>11)</sup> Additionally, a the tidal wave was was the direct cause for a nuclear catastrophe consisting of three reactor meltdowns at the Fukushima Daiichi Plant in Fukushima Prefecture.<sup>12)</sup> This triple disaster of earthquake, tsunami and nuclear accident led to the displacement of 470,000 evacuees.<sup>13)</sup> Much like the situation faced by the Chinese government four years prior, the Japanese government was now faced with a major disaster refugee housing crisis. In May 2011, two months after the disaster, the Japanese Ministry of Land, Infrastructure, Transport and Tourism announced a plan to contract the construction of 30,000 THS units, with another 30,000 added to the plan in April of 2011.<sup>14)</sup> However, due to the scope of devastation caused by the tsunami, beaurocratic infighting, a shortage of materials, complex construction requirements, and a desire shared by many evacuees to relocate together as a community, many evacuees were not able to transfer from emergency evacuation shelters to temporary housing communities until 2012. As of September 2015, 70,000 evacuees are still living in THS units in Northern Japan.<sup>15)</sup> This slow recovery was exacerbated by the nuclear incident in Fukushima which required the long-term evacuation of over 50,000 people from communities which remained cordoned off today.<sup>16)</sup> Some areas of Tohoku plan to maintain THS communities until at least 2017.<sup>17)</sup>

### **Temporary Housing Life in Sichuan**

In order to house Sichuan's 5 million evacuees, a vast amount of temporary shelters were necessary. Therefore, the Chinese government opted for THS units that provided only the most basic requirements for human habitation. It was stipulated that all THS units must be capable of surviving strong aftershocks, and that they would be easy to recycle once evacuees had transferred to more permanent housing. Therefore, THS units in Sichuan were engineered as single-story prefab houses made from disposable paneling. The interior of each unit consists of a single, 20 square meter room with a door and window that open up to the street. Although the THS units themselves were primitive, with some lacking glass windows, Doctors Without Borders described the general living conditions within these communities as 'relatively stable in terms of basic sanitation, security, and facilities'.<sup>18)</sup> The engineers dispatched by the Chinese government designed the Sichuan shelters to be well-ven-

tilated. However, the mountainous topography of Sichuan required that large communities of temporary houses be constructed together in closely-placed, opposing parallel rows.<sup>19)</sup> As such, housing conditions within Sichuan's THS communities were often cramped.

Typically, all family members lived and slept together in the same room. Some families were issued two adjoining units, and were thus able to divide their housing into a living area and a sleeping area. However, the majority of families turned the interiors of their one room shelters into bedrooms. In order to not disturb family members who were sleeping, many residents opted to set up an awning at the front of their shelter, using these makeshift porches as sitting areas. Thus, by spending a significant part of their day outside their shelters, Sichuan THS residents had frequent opportunities to chat with their neighbors. (Yoshitsubaki M. Interviewed by Michael Smith. Digital Recording. August 17 2015).

The central Chinese government declared that the residents of these units would be provided one hospital, one elementary school and one general store per ever 1000 temporary housing units and one middle school per every 2000 houses.<sup>20)</sup> This was part of the Chinese government's estimated 150 billion dollar plan to rebuild the social and industrial infrastructure of Sichuan within a 8 year time-line.<sup>21)</sup> While the Chinese government's reconstruction plans accommodated for the rebuilding of officially recognized stores, schools, hospitals and factories by 2015, their scope did not include the immediate, everyday needs of evacuee communities living within THS units. Many of Sichuan's evacuees responded to these unfulfilled service needs by turning the fronts of their temporary housing units into produce stalls, convenience stores, barber shops and DVD rental stores. Not only did the creation of these shops allow Sichuan's THS communities to interact with each-other on a regular basis, but they also aided in reestablishing a sense of normalcy and provided THS residents with a negligible level of income aside from government provided disaster relief stipends (Yoshitsubaki M. Interviewed by Michael Smith. Digital Recording. August 17, 2015).

All of Sichuan's THS units were constructed according to a uniform design laid down by the Chinese government in order to allow for fast construction and low cost. Each THS building consisted of a row of THS units four to ten units in length, with all units facing "inward" so that their entrances look out on the entrances of the opposite row. Although each unit was furnished with electricity and gas, none of Sichuan's THS units featured running water. Instead, residents were compelled to make use of large, communal water basins and toilets which were installed between rows of units at fixed intervals of one basin and one toilet facility for every fifty THS units.<sup>22)</sup> Although gas fixtures were installed in each unit, many residents opted to cook together in communal kitchens which were constructed outside, closer to water sources. Due to this centralization of water sources within the Sichuan's THS communities, all residents were compelled by need to leave their shelters at least once day in order to retrieve water, bathe or cook. (Yoshitsubaki M. Interviewed by Michael Smith. Digital

Recording, August 17 2015) Although these factors compelled Sichuan's THS communities to live in close proximity to one another in conditions which provided only the barest of necessities, it also appears that that these conditions provided THS residents with opportunities to encounter and socially interact with their neighbors on a day-to-day basis, thus preventing cases of physical isolation. Contrariwise, because of the inability for THS residents to physically isolate themselves for long periods of time, prolonged absences would be immediately noticed within the community.

### **Temporary Housing Life in Tohoku**

Following the Tohoku Earthquake and Tsunami, the Japanese Ministry of Land, Infrastructure, Transport and Tourism announced a plan to build 30,000 temporary housing units, increasing this number to 60,000 soon thereafter.<sup>14)</sup> Local governments were responsible for planning the design of THS units and the layout of THS complexes with input from their constituent communities. The responsibility of physically constructing many of the the THS units in Tohoku were delegated to local leasing companies belonging to Japan's Prefabricated Construction Supplier's Association in Tokyo, which the three most damaged prefectures — Miyagi, Fukushima and Iwate — had contracted. However, in later stages of Tohoku's THS construction, large home building companies from Tokyo and Osaka also began to play a role.<sup>23)</sup> Cost of construction associated with each THS unit, including plumbing, were found to be in excess of 5M yen (approximately 50,000 USD).<sup>24)</sup> The layout of individual THS units varies from complex to complex, with some complexes featuring multiple sizes of THS meant to house larger or smaller families. To the author's knowledge, which is based on personal observations made while volunteering in Tohoku and schematics provided by the Japan Institute of Architects, all THS units constructed in Japan after the Tohoku disaster were self-contained prefabricated homes ranging in size from single-room, 20 square meter units for individual residents to multi-room, 40 square meter units for larger families.<sup>25)</sup> Similar to Sichuan, land available for the construction of THS complexes was very limited, both due to the mountainous topography of Tohoku as well as the need to build on high ground far inland from the sea. In some cases, THS complexes in Tohoku were built as two or even three-story apartments in order to utilize limited space to its maximum.<sup>26)</sup> Meeting halls were built at a ratio of one hall per ever fifty THS units in order to give THS communities a place to gather and socialize or conduct community meetings.<sup>27)</sup>

Due to the designs utilized for Tohoku's THS complexes, the interiors of THS units more closely resembled small Japanese apartments than shelters. Each unit is furnished with its own utilities which include not only running water and electricity but also showers, bathtubs, toilets and kitchens.<sup>25)</sup> This contrasts sharply with the conditions in Sichuan's THS communities, where residents were compelled to leave their shelters often in order to use shared water sources, kitchens and

bathing facilities. Despite the obvious discomfort of living in the cramped, poorly insulated confines of a THS unit, Tohoku's THS units were furnished with all utilities necessary for daily living. Therefore, THS residents in Tohoku are not presented with an immediate necessity to leave their shelters except when shopping or, in the case of young people, going to work or school. When volunteering as a social support worker in Tohoku, the author observed that THS residents who were elderly, unemployed or stay-at-home mothers did not leave the interior of their shelter for several days, with testimonials from other residents reinforcing these observations (Miyagi Prefecture Citizens, interviewed by Michael Smith. Digital recording. Ishinomaki City & Minamisanriku Town, 2011 – 2013). One article in the Japan Times supports this observation, stating that THS residents may spend a few hours of each afternoon chatting in their THS community's meeting hall, but ultimately spend the majority of their days alone inside of their own shelter.<sup>28)</sup> Concerns of isolation apply not only to individuals, but also families living together in larger THS units.

THS units in Tohoku vary in size, with larger, multi-room THS units being allotted to families while single-room units were provided for single occupants.<sup>25)</sup> Multiple-room THS units allowed families to allot separate environments for different daily life activities without the need for any family members to exit their facilities. Whereas persons living in a single-room THS unit would be compelled to go outdoors to provide other family members with privacy in certain situations, this was not necessary for families in Tohoku. Sleeping, changing, bathing and all other daily activities which require a private or quiet environment could be performed with all family members remaining indoors. There are obvious benefits to this, such as reestablishing a sense of normalcy and protecting residents from the extremely cold winters of Tohoku. However, a complete self-encapsulation and isolation of THS residents may lead to isolation and a decrease in opportunities to interact with neighbors.

Compared to the THS communities in Sichuan, there are very few shops or stores in Tohoku's THS complexes. This is due to Japanese laws which define Tohoku's THS complexes as single-story "residences" which cannot engage in business that involves commerce. Japanese home business laws stipulate that any person who operated a commerce-related businesses out of their home must engage in this business on a separate floor from their living quarters, and that street stalls are also disallowed unless the previous requirement of separate floors for business and lodging is already fulfilled.<sup>29)</sup> As a result of these strict regulations, it would be extremely difficult for any resident living in Tohoku's THS communities to start a small business out of their shelter. However, there are some exceptions: Japanese law does permit certain types of business to be conducted in single-story private homes assuming they fall under a category of businesses which provide services related to "medical treatment". In Japan, this reference to medical treatment typically refers to chiropractors, salons and barber shops. Occasionally, these legally exempted businesses were seen in Tohoku's THS communities (Iwamoto A., Peace Boat, private communication, October 15 2015).

The lack of shops within Tohoku's THS complexes often compelled residents to visit stores outside of their communities in order to fulfill their daily needs. However, many elderly THS residents in Tohoku are not physically able to travel great distances for shopping, and many THS complexes are located far away from city centers.<sup>30)</sup> This issue prompted city officials in Kessennuma City, Miyagi Prefecture, to approach a major convenience store chain and request that a store be built on the premises of one of the city's THS complexes. Soon after this convenience store opened for business, its employees began to offer personalized, door-to-door delivery service of food and everyday goods to other surrounding THS communities which did not have their own convenience stores.<sup>31)</sup> While delivery services like this are beneficial to elderly THS residents who are not physically able to walk or bicycle to stores, door-to-door delivery services may also have negative social implications: because the door-to-door delivery of food and other necessities is provided, there is a lessening of incentive for THS residents to go outdoors and possibly interact with their neighbors. Furthermore, some residents who are physically able to travel to local stores may instead decide to rely on delivery services, thereby reinforcing reclusive tendencies.

In contrast to the door-to-door merchants, there were other delivery services which did act as sources for social interaction among Tohoku's THS residents. One such service was provided by the "meals-on-wheels" - like "*idouhanbai*" merchants, which provided perishables, sundries and pre-prepared meals to many THS communities.<sup>32)</sup> Rather than providing door-to-door service to individual THS residents, *idouhanbai* merchants instead parked at the end of THS complexes and played music from speakers on their trucks.<sup>33)</sup> Typically, *idouhanbai* merchants operated on a schedule and visited THS communities at a specified time. This promoted habits among THS residents to exit their shelters and wait for the merchant's arrival or browse their goods as a group. These services enjoyed notable success within the Tohoku THS communities, with many NGOs and disaster relief agencies moving to promote and support local entrepreneurs who were willing to provide *idouhanbai* services to THS communities.<sup>34)</sup> While *idouhanbai* are one example of a successful attempt on the part of Japanese NGOs and governments to foster greater community interaction within Tohoku's THS communities, there were also other attempts which proved less effective.

Each THS complex in Tohoku was equipped with a large community center which was intended to provide residents with a place to hold meetings and host social events. Volunteer organizations frequently held events at these community centers encouraged THS residents to become involved in their own community and provide important opportunities to vocalize their anxieties. However, upon visiting these community centers several speaking to THS residents, the author was informed that many THS community members declined to participate in events or visit their complex's community center. Frequently cited reasons for this lack of participation were that many young community members were too busy working to rebuild their homes, or that the events at the community centers

were “difficult to participate in”. (Ishinomaki Citizens, interviewed by Michael Smith. Digital recording. Ishinomaki City, Sep. 4 – 14 2013). This disparity in useage of THS community centers has also been noted by Japan’s media.<sup>28)</sup> While the intent behind the construction of the community centers in Tohoku’s THS complexes was to provide residents with a place to socialize, these facilities only appear to appealws to one segment of the community. Meanwhile, young residents who were too busy to frequently participate in community events, physically disabled residents and those experiencing symptoms of depression were less likely to make use of these facilities.

### **Mental Health in Sichuan and Tohoku’s Temporary Housing Shelters**

Studies performed after the Sichuan earthquake found that rates of PTSD and depression among adult survivors were on parity with victims of similar disasters in Asia, with expressed symptoms of PTSD and depression slowly decreasing among surveyed subjects. Furthermore, studies conducted on adult subjects one month, six months and one year after the earthquake found the occurrence of PTSD and major depression in Sichuan disaster victims to diminish over time at rates comparable to other disaster populations, with an 23% occurrence rate of PTSD in adults one year after the disaster compared to 85% immediately following the earthquake.<sup>35–37)</sup> Another study conducted one month after the earthquake made the unexpected discovery that the number of Sichuan adolescents which contemplated suicide actually decreased following the earthquake, despite subjects’ lives being immediately affected by the disaster.<sup>38)</sup> Despite the obvious presence of PTSD and clinical depression in Sichuan’s disaster victims, there are few media reports of suicide or deaths related to “psychological fatigue” or “isolation” in post-disaster THS communities. A complete lack of information might suggest censorship on the part of the Chinese government, but there are notable exceptions where high profile suicides by government officials were publicized.<sup>39)</sup> The question of censorship remains, but one may posit that “stress-related” deaths stemming from physical isolation and resultant depression were not prevalent within Sichuan’s THS communities.

According to studies performed immediately following the Tohoku disaster as well as later follow-up studies, the mental health outcome of the Tohoku disaster community appears to differ significantly from Sichuan. Unlike the survivors of the Sichuan Earthquake, the expression of psychological distress in Tohoku residents varies more depending on location and whether or not they were affected by the earthquake, tsunami or nuclear components of the Tohoku Disaster, with victims of the Fukushima nuclear accident suffering higher rates of PTSD and depression for a longer period of time than Tohoku Disaster survivors in other regions. For example, one study conducted nine months after the Tohoku Disaster on the community of Hirono, Fukushima found that 53% of THS residents expressed symptoms of PTSD while 66% reported symptoms of depression



despite only two members of their community perishing as a direct result of the earthquake and tsunami.<sup>40)</sup> Furthermore, contrary to findings in Sichuan which seem to indicate that adolescents among earthquake survivors were less affected by post-disaster suicide ideation, and other studies of Asian populations which posit that youth may mitigate disaster-related anxiety<sup>41)</sup>, adolescence did not appear to be a mitigating factor in preventing long-term PTSD in children affected by the Tohoku Disaster. One study performed by the Japanese Ministry of Health found that 34% of children in Iwate, Miyagi and Fukushima prefectures were still suffering from PTSD symptoms such as anxiety and insomnia one and a half to two years following the disaster. In comparison, the same study found that only 4% of children expressed PTSD symptoms in the control group in Mie prefecture, which was not directly impacted by the Tohoku disaster.<sup>42)</sup>

A loss of employment or purpose is one reason commonly cited for depression among both Tohoku and Sichuan disaster victims. In the case of Tohoku victims, it is often cited as one of the reasons why THS residents withdraw into their shelters and become reclusive.<sup>43)</sup> This can lead to cases of social isolation and *kodokushi* not only among the elderly or disabled but also among middle-aged THS residents. One of the methods which local Tohoku governments and volunteer organizations utilized to prevent the isolation of at-risk THS residents was to set up caretaker patrols which regularly checked in on elderly and socially isolated residents. The Japanese NGO Peace Boat has published and distributed a newsletter to Tohoku THS residents since October of 2011, with the secondary goal of their activities being the monitoring and psychological support of THS residents.<sup>44)</sup> However, it has been reported that some THS residents find frequent visits from volunteers to be stressful. In an attempt to protect residents well-being while also respecting their privacy, self-governing councils of some THS communities asked residents to place flags at the front of their shelters every morning to indicate that they were physically well, or installed motion-detecting sensors within residents' homes, but the problem of residents feeling intruded upon remained.<sup>45)</sup> One news article noted that some THS residents outright refused regular visitation by volunteers or free emergency contact cellphones offered by municipal officials.<sup>46)</sup> All of these incidents point to a conflict between THS residents' desire for privacy and the necessity to provide assistance to those residents who require special psychological support and monitoring.

In spite of the efforts of volunteers and local governments, the number of "stress-related" deaths and instances of *kodokushi*, have continued to grow. One survey conducted by the Asahi Shimbun in January of 2014 showed that over 2,900 people in Tohoku had died due to physical and mental fatigue caused by the aftermath of the disaster.<sup>47)</sup> In the prefecture of Fukushima, where the majority of these cases have occurred, the total number stress-related deaths now outnumber those deaths which were directly caused by the earthquake and tsunami.<sup>48)</sup> Furthermore, the total number of individuals who have died in circumstances which can be considered *kodokushi* in the prefectures of Fukushima,

Iwate and Miyagi have been slowly increasing every year, with the largest number of *kodokushi* — 44 cases — occurring in 2014. Of the cases recorded so far, 60% of the victims were over the age of 65.<sup>49)</sup> It is likely that the “stress-related” deaths and *kodokushi* occurring in Tohoku's THS communities are not caused by psychological issues alone; long-term withdrawal into cramped THS units can lead to health issues which, in turn, lead to worse mental health outcome. One study performed by a team of doctors from Niigata University observed a three-fold increase in blood clots in THS residents in Tohoku between 2011 and 2014, indicating pronounced levels of physical inactivity.<sup>50)</sup> A sedentary lifestyle, combined with social isolation and post-disaster mental health issues is clearly taking its toll on the population of Tohoku's THS communities. This underlines the importance of ensuring that THS residents are compelled to remain physically active as well as socially engaged.

### Cultural and Demographic Differences

As explained in the previous sections, there were many differences in the construction and layout of THS complexes in Sichuan and Tohoku that may have led to more or less favorable psychological outcomes among their inhabitants. Among them, the physical need for THS residents in Sichuan to leave their shelters in order to retrieve water, shower, cook or buy groceries may have been key in preventing cases of isolation and *kodokushi*-like phenomenon among residents. Contrariwise, the physical construction of Tohoku's THS complexes, including self-enclosed sinks, baths, toilets and kitchens as well as door-to-door delivery and other conveniences which limit the need to go outdoors may have contributed to a worsening of psychological issues which manifested in Tohoku THS residents, leading to a greater number of “stress-related” deaths and *kodokushi*. However, there are two other factors which must be taken into consideration: the significant cultural and demographic differences between the Chinese and Japanese disaster victims.

The people of Tohoku are known, even among other Japanese, to be stolid. The Japanese notion of *gaman*, or silent endurance, is frequently extolled in many regions of Japan but especially in Tohoku.<sup>51, 52)</sup> Indeed, *Ame ni mo makezu*, a famous poem by Tohoku native Kenji Miyazawa and one of the most frequently cited literary works of Tohoku, begins with the lines: “Unbeaten by rain, unbeaten by wind, unbowed by snow”, thereby demonstrating the extent to which Tohoku residents view stoicism as a virtue. While this stoicism allowed for an almost superhuman level of civic orderliness in the immediate aftermath of the Tohoku disaster, in later phases of the recovery the attitude of *gaman* may have caused many Tohoku THS residents to suffer silently, both physically and psychologically.<sup>53, 54)</sup> Furthermore, the disaster survivors of Tohoku have shown mistrust for psychological counseling, and have a tendency to view psychological treatment as something alien.<sup>55)</sup> This reluctance to seek treatment, combined with a difficulty to speak about depression and anxiety due

to Tohoku's *gaman* culture, may have prevented many of Tohoku's THS residents from speaking out about their personal suffering.

In contrast to the people of Tohoku, who are stoic even by Japanese standards, the people of Sichuan are known to be especially outgoing among other Chinese. Yoshitsubaki Masamichi, the head secretariat of Japanese non-profit organization CODE, is a Japanese national who has assisted with the reconstruction efforts in Sichuan since the very early stages of post-disaster rebuilding. In a private message, he culturally describes the people of Sichuan as “people who do their best to forget the hardships of the past and live proactively.” Furthermore, Yoshitsubaki also refers to the citizens of Sichuan as very outgoing people who are “quick to become friends with other people living in temporary housing shelters. Even if their neighbors are complete strangers, [Sichuan's THS residents] tend to speak to one-another.” (Yoshitsubaki M. Private Communication with Michael Smith. October 14, 2015) From this, it can be understood that disaster victims in Sichuan are not as likely to remain silent about personal suffering. However, there were still cases of disaster victims in Sichuan who avoided mental health counseling for the sake of their families. One such case is recorded in a news release by Doctors Without Borders, in which a patient who lost his wife in the earthquake was suffering from anxiety and insomnia leading to extreme sleep deprivation and feelings of desperation. Despite his own suffering, he felt that he could not express his feelings because he had to be brave for his two children.<sup>18)</sup> The reasons which Sichuan disaster victims cite for avoiding psychological counseling are similar to those encountered in Tohoku: psychological counseling is an alien idea to many in rural China, and an admission of a need for mental care is viewed as an admission of mental illness or insanity.<sup>8)</sup> In other words, the reasons cited for avoidance of psychological counseling among both populations share a similarity in that both populations did not have extensive prior exposure to mental therapy, thereby leading to mistrust and avoidance.

Yet another important factor which must be taken into account when considering the different psychological outcomes of the Sichuan and Tohoku disasters are those of demographics. Advanced age has been identified as a significant variables in the manifestation and severity of as well as speed of recovery from disaster-induced psychological disorders such as clinical depression and PTSD in both Sichuan and Tohoku populations.<sup>41, 56, 57, 58)</sup> Therefore, it is important to consider what differences in age distribution between the populations of Sichuan and Tohoku.

Sichuan is, on the whole, younger than Tohoku. According to a 2013 report by the UN, 79% of the 80 million people which resided in Sichuan fell into the age range of 14 to 64 years of age, with only 9% of Sichuan's population over the age of 65 and the remaining 11% being age of 14 and under.<sup>59)</sup> In contrast to this, a survey conducted by Japan's Ministry of Internal Affairs Statistics Bureau found that, of the 5 million people residing in Tohoku's three most hard-hit prefectures — Iwate, Fukushima, and Miyagi — 60% were between the ages of 15 and 64, while 25% were over the age of 65 with the

remaining 12% being under the age 14 and under. Furthermore, 14% of the population of these three prefectures was found to be over 75 years of age.<sup>60)</sup> These statistics show that the the population of Tohoku had a much higher percentage of aged residents during its disaster and recovery compared to Sichuan. As studies have shown, it may be these elderly individuals who suffer the most stress in post-disaster due to a drastic environmental change and little hope of starting over. Indeed, as several Japanese news outlets have pointed out, many of the Japanese who still live in THS communities in 2015 are elderly and do not have the financial means to build new homes.<sup>15, 50)</sup> Aside from the cultural differences between Tohoku and Sichuan's THS residents and the environmental differences caused by the way their shelters were engineered, this large disparity in age — and the difficulty that aged persons face in physically, psychologically and financially coping with disaster — may explain the disparity in psychological outcomes of both populations.

## Conclusion

A significant portion of Tohoku's THS communities, particularly elderly THS residents living alone, appear to have suffered from significant social isolation with some cases resulting in a worsening of pre-existing psychological distress symptoms and a deteriorating of physical health that led to cases of post-disaster "stress-related" deaths and *kodokushi*. In contrast to this, the THS communities of Sichuan did not appear to suffer from as many cases of post-disaster "stress-related" deaths nor phenomenon similar to *kodokushi*. It is the author's belief that, apart from cultural and demographic differences, the presence or lack of strong motivators for social interaction may have have impacted the mental health outcomes of both THS populations. Whereas the residents of Tohoku were housed in compartmentalized, utility-furnished THS units which allowed their residents to remain indoors and isolated for days at a time, Sichuan THS residents were compelled to go outdoors several times a day, thereby increasing their opportunities to meet and interact with their neighbors and build social bonds within their community. Even more significant is the fact that Sichuan THS residents themselves were able to build stalls and shops within their THS complexes and engage in small-scale businesses. Not only did these businesses act as a medium for community-building in Sichuan's THS communities, they also generated revenue for their shop-keepers, thereby aiding them in regaining their independence. Finally, the physical effort required to manage these stores likely acted as a psychological catharsis for their shop-keepers by providing an emotional outlet for residents who may have otherwise confined themselves indoors.

"Idobata" is a Japanese word which refers to community members going to a well every morning to draw water, then staying there to engage in small-talk and trade rumors. As Japan is now a modern, post-industrial society, there is a diminishing necessity to gather in public areas for any reason, and

highly concentrated population centers have given birth to a strong preference for privacy and quiet over community. This desire for privacy and quiet may have even influenced some of the decisions which were made in the design of THS complexes after the Hanshin and Tohoku disasters. However, in observing methods utilized by other Asian cultures in designing their own disaster shelters, the Japanese government may discover new ways to prevent social isolation and deteriorating mental health among future refugee populations. As Tohoku enters its fifth year of recovery, the number of “stress-related” deaths and *kodokushi* in remaining THS communities continues to grow. Serious consideration should be given to how future temporary housing in Japan will be designed and regulated.

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